

WHAT IS CLAIMED IS:

1 1. An apparatus for applying components of one or more source
2 materials to spatially addressable, predefined locations onto a substrate, the apparatus
3 comprising:

4 at least one source material; and

5 a potential assembly for applying a spatially varying potential across said
6 substrate, said spatially varying potential causing components of said source material to
7 deposit at said spatially addressable, predefined locations.

1 2. The apparatus of claim 1, wherein said spatially varying potential is
2 a spatially varying electric potential.

1 3. The apparatus of claim 1, wherein said spatially varying potential is
2 a spatially varying magnetic potential.

1 4. The apparatus of claim 1, wherein said spatially varying potential is
2 a spatially varying chemical potential.

1 5. The apparatus of claim 2, wherein the potential assembly comprises
2 a power source and an array of spatially addressable working electrodes coupled to or
3 embedded within said substrate, said working electrodes being coupled to said power
4 source such that a different potential may be applied to each of said working electrodes.

1 6. The apparatus of claim 5, further comprising a reference electrode
coupled to said power source.

1 7. The apparatus of claim 5, further comprising a plurality of reference
2 electrodes coupled to said power source, wherein each of said reference electrodes is
3 located adjacent to each of said spatially addressable working electrodes.

1 8. The apparatus of claim 5, wherein each of said spatially addressable,
2 predefined locations is defined by each of said working electrodes.

1 9. The apparatus of claim 2, further comprising an ionic solution in
2 contact with said substrate.

1 10. The apparatus of claim 1, wherein said substrate is formed from a
2 material selected from the group consisting of polymers, plastics, pyrex, quartz, resins,
3 silicon, and silica-based materials.

1 11. The apparatus of claim 5, wherein said substrate comprises silicon
2 dioxide and said spatially addressable working electrodes are metal electrodes.

1 12. The apparatus of claim 1, further comprising an enclosure housing
2 said substrate therein, wherein said substrate is immersed in a bath of said source material.

1 13. The apparatus of claim 12, wherein said bath further comprises a
2 solution of ions.

1 14. The apparatus of claim 2, wherein said potential assembly comprises
2 a working electrode and a reference electrode, wherein said electric potential of said
3 working electrode varies substantially continuously across a surface of said working
4 electrode.

1 15. The apparatus of claim 14, wherein said substrate is a resistive
2 material.

1 16. The apparatus of claim 3, wherein said potential assembly comprises
2 an array of spatially addressable magnets each having a pole positioned adjacent said
3 substrate.

1 17. The apparatus of claim 16, wherein said magnets are coupled to or
2 embedded in the substrate.

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1 18. The apparatus of claim 16, wherein said source materials possess net
2 magnetic moments, and wherein said magnets create spatially addressable magnetic field
3 gradients that attract components of said source materials such that said source materials
4 accumulate adjacent to each of said magnets in proportion to a field strength of each of
5 said magnets.

1 19. The apparatus of claim 4, wherein said source material is positioned
2 relative to said substrate such that a flux of said components deposited onto said substrate
3 varies across said substrate.

1 20. The apparatus of claim 19, wherein said source material comprises
2 an isotropic point molecular source.

1 21. The apparatus of claim 19, wherein said substrate and said source
2 material are movable relative to each other such that a spatially varying pattern of
3 combinations of materials may be deposited onto said substrate.

1 22. The apparatus of claim 19, further comprising a transport matrix
2 positioned between said substrate and said source material, said transport matrix providing
3 a diffusion mask for said source materials, said diffusion mask controlling deposition of
4 said components of said source materials onto said spatially addressable, predefined
5 regions.

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1 23. The apparatus of claim 1, wherein said potential assembly is
2 configured to apply said components of said source materials onto said substrate in
3 patterns, said patterns allowing comparison of specific material characteristics of said
4 materials deposited at said spatially addressable, predefined locations.

1 24. The apparatus of claim 1, wherein said potential assembly is capable
2 of depositing at least 9 different materials to at least 9 different locations of said spatially
3 addressable, predefined locations.

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1 ~~A3~~ 25. The apparatus of claim 1, wherein said substrate comprises at least 1
2 spatially addressable, predefined location per square centimeter.

1 26. A method of applying components of one or more source materials
2 to spatially addressable, predefined locations on a substrate, said method comprising the
3 steps of:

4 applying a spatially varying potential across said substrate; and
5 depositing at least two components of at least one source material onto at
6 least two spatially addressable, predefined locations on said substrate.

1 27. The method of claim 26, wherein said applied spatially varying
2 potential is an electric potential.

1 28. The method of claim 26, wherein said applied spatially varying
2 potential is a magnetic potential.

1 29. The method of claim 26, wherein said applied spatially varying
2 potential is a chemical potential.

1 30. The method of claim 27, wherein said depositing step comprises
2 contacting said substrate with an ionic solution to generate electrochemical deposition of
3 said components of said source material.

1 31. The method of claim 27, wherein said applying step comprises
2 applying said electrical potential to a plurality of spatially addressable working electrodes
3 located at said spatially addressable, predefined locations, wherein said electric potential
4 varies at each working electrode to vary said component deposited onto said corresponding
5 spatially addressable, predefined location.

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1 32. The method of claim 26, wherein said applying step comprises:
2 applying an electrical potential to a working electrode, wherein said
3 electrical potential varies along a length and a width of said working electrode;
4 providing a first component of said source materials to said working
5 electrode to deposit said first component onto a first spatially addressable, predefined
6 location; and
7 providing a second component of said source materials to said working
8 electrode to deposit said second component onto a second spatially addressable, predefined
9 location.

1 33. The method of claim 26, wherein said applying step comprises
2 applying a spatially varying magnetic potential to an array of spatially addressable
3 magnets, each magnet having a pole positioned adjacent to said substrate.

1 34. The method of claim 29, wherein said applying step comprises
2 delivering a first component of said source material positioned a distance from said
3 substrate, and allowing first component of said source material to deposit onto said
4 substrate such that a flux of components varies across said substrate.

1 35. The method of claim 34, further comprising the steps of:
2 moving said source material relative to said substrate; and
3 delivering a second component from said source material to generate a
4 spatially varying pattern of combinations of said first and second components on said
5 substrate.

1 36. The method of claim 26, further comprising applying the
2 components of said source materials onto said substrate in patterns that allow comparison
3 of at least one specific material characteristic.

1 37. The method of claim 26, wherein at least 9 different materials are
2 deposited on at least 9 different locations of said spatially addressable, predefined
3 locations.

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1 38. A material having a desired property prepared by a process
2 comprising the steps of:
3 applying a spatially varying potential across a substrate;
4 depositing at least ten components of at least one source material onto at
5 least ten predefined, spatially addressable locations on said substrate to form an array of
6 resulting materials on said substrate;
7 screening said array of resulting materials for said desired property; and
8 determining which of said screened resulting materials has said desired
9 property.

1 39. An apparatus for screening a plurality of materials for a specific
2 material characteristic, the apparatus comprising:
3 an array, wherein said plurality of materials correspond to a plurality of
4 predefined locations on said array;
5 a plurality of electrodes, wherein said plurality of electrodes correspond to
6 said plurality of predefined locations; and
7 means associated with said plurality of electrodes for testing each of said
8 plurality of materials for said specific material characteristic.

1 40. The apparatus of claim 39, wherein said specific material
2 characteristic is an AC impedance.

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